

Response to Public Comment
Maguro Enterprises, LLC (Google)
Groundwater Withdrawal Permit Application

Summary of the Application

Request

Maguro Enterprises, LLC (Maguro or Google) has applied to the South Carolina Department of Health and Environmental Control (SC DHEC) for an increase in their groundwater withdrawal permit from 182.5 to 549 million gallons per year (MGY) from their existing production well.

Purpose

Maguro would use the water to cool their data servers in a closed-loop system. The water circulates through the system and is supplemented as needed due to evaporation. Water would not be re-injected to the aquifer from which it was withdrawn nor discharged back into the environment.

Components of the Application

- An administratively complete Groundwater Withdrawal Permit Application^a.
- A report entitled "Berkeley County Data Center Expansion Water Needs, August 2017". This report includes:
 - Details about the cooling process: *Evaporative cooling allows the site to reduce the overall energy consumption by as much as half compared to the majority of other operating data centers today. During the cooling process, the water will be recycled repeatedly until almost all of it has evaporated. To support this recycling, a new technology will be used to treat the incoming groundwater supply to allow for nearly 100% usage efficiency with nearly zero wastewater production.*
 - Groundwater use is minimized by using surface water from Berkeley County Water & Sewer Authority and a rainwater retention pond on site.
 - A report entitled "Water Supply Alternative Analysis, September 2017" prepared by Fox Engineering Associates, Inc. This report was further vetted by the engineering firm WSP USA (formerly Leggette, Brashears & Graham).
 - A report entitled "Hydrogeologic Report for Support of Groundwater Withdrawal Permit Application for 1.5 MGD for Well TW-1, Moncks Corner, South Carolina, July 2017" prepared by WSP USA. This report includes:
 - Test Well installation and construction details.
 - Complete description of stratigraphy and characteristics of the aquifer obtained during drilling of wells.
 - Results of both step-rate and 72-hour constant rate pumping tests used to determine local hydraulic conductivity of the aquifer.

- A groundwater flow model modified from the South Carolina Coastal Plain model developed by the USGS^b to include mesh refinement in the area of the Berkeley Data Center, updated hydraulic conductivity values from the pump tests, and updated water use statistics from the model's original publication in 2007^c.
- Water quality, nutrients, and metal analysis of water samples taken from the test wells.
- Best Management Plan for Industrial Water Use.
- Letters from various organizations in support of the application.

Public Comments

During the public comment period beginning May 13, 2019 and ending June 12, 2019, SC DHEC received 174 submissions using 171 individual e-mail addresses from the general public as well as submissions from one water supply company, one conservation organization, and one environmental law firm. The following is a summary of the comments received from the general public with the SC DHEC response following each.

Comment: Salt Water Intrusion and Land Subsidence

DHEC Response: Salt water intrusion into fresh water portions of an aquifer occur by infiltration of surface salt water, landward movement of the fresh water/saltwater boundary within an aquifer, or upward migration of ancient salty water deep in an aquifer system. All three of these mechanisms are either exacerbated or induced by over pumping of groundwater from an aquifer along with rising sea levels. Currently, the locations of the saltwater/fresh water boundaries in the Middendorf aquifer system (Mt. Pleasant) or the Crouch Branch aquifer (Georgetown) are unknown.

A USGS modeling report^d suggests that over the current permitting cycle for the Trident Capacity Use Area (2018 – 2023), the proposed withdrawal rate by Maguro Enterprises would not significantly impact the cone of depression that currently exists below Mount Pleasant centered 22 miles away.

Land subsidence due to over pumping of groundwater from an aquifer has become a problem in many parts of the United States. A recent study using more than 216 continuous GPS stations indicates that land subsidence is occurring along the East Coast of the United States from Connecticut to South Carolina^e. The study used geologic rates of relative sea-level (RSL: indication of long-term land deformation) to "correct" the continuous GPS record revealing recent changes in the vertical movement of land surface from Virginia to South Carolina. These recent changes were attributed accelerated land subsidence associated with groundwater level reductions from large groundwater withdrawals in these areas. A USGS fact sheet on subsidence states that more than 80 percent of identified subsidence events in the United States are the result of human impact on subsurface water. Land subsidence in South Carolina is a concern for the Agency as the

combined effect of sea-level rise and land subsidence can lead to increased flooding during storm events and increased salt water intrusion for coastal wells.

Comment: Issuing a permit for 1.5 MGD from the Middendorf Aquifer is not a Scientifically-Based Decision

DHEC Response: The SC DHEC Water Quantity Permitting Section (the Department) issues permits in accordance with the Groundwater Use and Reporting Regulations (R.61-113) pursuant to South Carolina Code Sections 49-5-10 through 49-5-150. Specifically, Section 49-5-20 states:

The General assembly declares that the general welfare and public interest require that the groundwater resources of the State be put to beneficial use to the fullest extent to which they are capable, subject to reasonable regulation, in order to conserve and protect these resources, prevent waste, and to provide and maintain conditions which are conducive to the development and use of water resources.

The entire South Carolina Code may be found here:

<https://www.scstatehouse.gov/code/t49c005.php>

The SC DHEC Regulation may be found here:

<https://www.scdhec.gov/sites/default/files/media/document/R.61-113.pdf>

The Department uses the best available data and research when making permitting decisions. As the Department reviews any application, a variety of data sources are used including the history of reported water use (if an existing customer), water level trends in the aquifer being considered (SC DNR monitoring well network), proximity of a proposed well to existing wells or streams and rivers (GIS coverage), any Groundwater Management Plan that may be in effect, the latest information on water use standards for the specific industry (if available), and current local groundwater research including groundwater models, land subsidence, and saltwater intrusion. The permit decision is ultimately made based on whether the request is reasonable and the long-term or potential long-term impact to the aquifer and neighboring water withdrawers. For this permit review, the Department is also using the groundwater model developed by Maguro and the USGS model developed for Mount Pleasant Waterworks.

The following is a list of data sources and references we are using as we evaluate this permit application.

- Data provided by Maguro including pump tests, analysis of current alternative sources of water, groundwater flow model based on the USGS regional groundwater flow model, and stratigraphy revealed during drilling and well installation.
- A Best Management Plan for water use on file as provided by Maguro including efficiencies in place as part of the closed-loop cooling system that would be used for the data center.
- Historic water use data reported to SC DHEC.

- SC DNR monitoring well data for wells located in Berkeley, Charleston, and Dorchester Counties.
- SC DNR Potentiometric Maps of the Middendorf aquifer system.
- SC DHEC GIS data of well locations in the Trident Capacity Use Area.
- Recent study on land subsidence in South Carolina.
- The current Trident Capacity Use Area Groundwater Management Plan (May 11, 2017).
- The current South Carolina State Water Plan produced by SC DNR (2004 2nd edition).
- A USGS modeling report based on the updated groundwater flow model (ref).

Comment: Permit Decision Should be Delayed until: USGS Model is Updated, State Water Plan is Updated, Trident Capacity Use Area

DHEC Response: The full regional groundwater flow model is anticipated to be released in the fall of 2019. In 2017, an updated version of this model was used to analyze a variety of groundwater withdrawal scenarios in the coastal region containing the Trident Capacity Use Area. The results of this model are part of the data being used to evaluate the current application.

Both the State Water Plan and the Groundwater Management Plan for any Capacity Use Area are considered 'living' documents that will undergo changes and updates as conditions change in the state. SC DNR is currently working with the Process Planning Advisory Committee (PPAC) to update the State Water Plan. Members of the Trident Capacity Use Area have begun discussions to update the Trident Area Groundwater Management Plan. Because the Department utilizes a variety of data sources in the permit decision-making process and because these sorts of management documents are regularly reviewed and revised, the Department does not delay permitting decisions for each update or review.

Comment: Water Use Priority Should be Given to Drinking Water over Industry

DHEC Response: The Department does not prioritize water use applications. Permit applications are reviewed for the 'reasonableness' of the request for the intended use.

Comment: Google Needs to Explore Alternate Sources of Water

DHEC Response: The application includes an analysis of alternatives to groundwater for use in cooling the servers at the proposed Berkeley Data Center expansion. Potable water purchased from Berkeley County Water & Sanitation (BCWS) as well as storm water collected on-site are currently used to cool existing server infrastructure as well as supply potable water for the employees. The analysis included 1) increasing the amount of potable water purchased from BCWS, 2) building an intake to withdraw water from nearby surface water, 3) stormwater collection on-site, and 4) greywater provided by local waste water treatment plants (WWTP).

- 1) Increasing Potable Water Purchased from BCWS: The existing water main servicing the Berkeley Data Center is at maximum capacity and is insufficient to supply the water needs of the planned expansion. Maguro has been working with BCWS for 5 years to develop a new water main with an increased capacity to supply the Berkeley Data Center as well as benefit BCWS and its customers. Three different pathways have been designed for the new water supply line, but construction has been hindered on each by easement acquisition and right-of-way issues. Maguro has paid for all of the associated design expenses. As part of this plan, Maguro has designed, built, and paid for a water tower on Highway 52 that will also benefit BCWS and its customers but remains unused due to the insufficient capacity of the existing water main.

The BCWS plan was then abandoned and a new plan developed in 2017 to design an alternate line supplying water from Charleston Water & Sewer (CWS). This line would supply the Berkeley Data Center needs in addition to provided increased capacity for BCWS. This plan has also encountered delays due to easement acquisition issues.

Maguro continues to support the CWS plan, but the inability between the two water supply companies to build and maintain a line even with Maguro paying for the expense means that potable water is not a viable source at this time.

- 2) Building a surface water intake exclusively to supply water to the Berkeley Data Center:

This option required additional permitting beyond easement acquisition including permits to build through a wetland. Therefore, this idea was abandoned.

3) Stormwater Collection On-site

Stormwater is currently collected from one of three ponds on-site. By using the current pond and deepening a second pond, as well as expanding the current stormwater treatment system, it is estimated that 59% of the captured stormwater (~ 116 MGY) could be reused for the expanded data center's cooling needs. Maguro will continue to use stormwater to supplement the data center water needs.

4) Greywater

There are 11 total greywater dischargers that were identified during the analysis of greywater use by Maguro. Two of them were further identified as have the potential volume sufficient to provide the water needed for the proposed data center expansion. Only one of the two currently processes enough greywater to provide sufficient volume to the data center, and it is located more than 10 miles away. Use of greywater is still being considered for the future, but it will take several years to develop.

Comment: Google is not Transparent in Their Current Water Use or Business Practices

DHEC Response: This comment is outside the scope of SC DHEC's regulatory authority and will, therefore, not be addressed.

Comment: SC DHEC is not Doing its Job. DHEC is Bowing to Pressure from a Large Company

DHEC Response: The regulations, steps in the water quantity permitting process, description of South Carolina's groundwater resources, and groundwater management plans are always available on SC DHEC's website. Links for this information are provided at the end of this document. As described in more detail under the first two responses to comments, the Department uses current data and research in the analysis of every Groundwater Withdrawal Permit application received—always keeping in mind whether the request is reasonable and the long-term or potential long-term impact to the aquifer and neighboring water withdrawers.

Resources

SC DHEC:

Agency Web Address

<https://www.scdhec.gov/>

Groundwater Withdrawal Permitting & Capacity Use Areas

<https://www.scdhec.gov/environment/water-quality/groundwater-use-reporting/groundwater-management-planning/groundwater-0>

Groundwater Use Reporting and Groundwater Withdrawal Overview

<https://www.scdhec.gov/environment/water-quality/groundwater-use-reporting>

Regulation R.61-113 Groundwater Use and Reporting

<https://www.scdhec.gov/sites/default/files/media/document/R.61-113.pdf>

Groundwater Management Planning

<https://www.scdhec.gov/environment/water-quality/groundwater-use-reporting/groundwater-management-planning>

Groundwater Process and Plan Development

<https://www.scdhec.gov/environment/water-quality/groundwater-use-reporting/groundwater-management-planning/groundwater-5>

Groundwater Resources

<https://www.scdhec.gov/environment/water-quality/groundwater-use-reporting/groundwater-resources>

Environmental Public Notices

<https://www.scdhec.gov/environmental-public-notice>

South Carolina Watershed Atlas

<https://gis.dhec.sc.gov/watersheds/>

SC DNR:

Agency Web Address

<http://www.dnr.sc.gov/>

Water Planning in South Carolina

<http://www.dnr.sc.gov/water/waterplan/index.html>

South Carolina Groundwater Data

<http://www.dnr.sc.gov/water/hydro/groundwater/groundwater.html>

South Carolina Groundwater-Level Monitoring Network
<http://www.dnr.sc.gov/adr/wellinfo>

SC Code of Law:
Groundwater Use and Reporting Act
<https://www.scstatehouse.gov/code/t49c005.php>

^a SC DHEC (2008) Groundwater Withdrawal Permit Application Guide for Designated Capacity Use Areas. Columbia, SC. https://www.scdhec.gov/sites/default/files/docs/Environment/docs/gw_cupPermit.pdf.

^b USGS (2007) SIR 2007-5126

^c SC DHEC Groundwater Use Reporting webpage (<https://www.scdhec.gov/environment/water-quality/groundwater-use-reporting>).

^d Fine, J.M., Petkewish, M.D., and Campbell, B.G., 2017, Simulation of groundwater flow and pumping scenarios for 1900 – 2050 near Mount Pleasant, South Carolina (ver. 1.1, November 6, 2017): U.S. Geological Survey Scientific Investigations Report 2017-5128, 36 p. <https://doi.org/10.3133/sir20175128>.